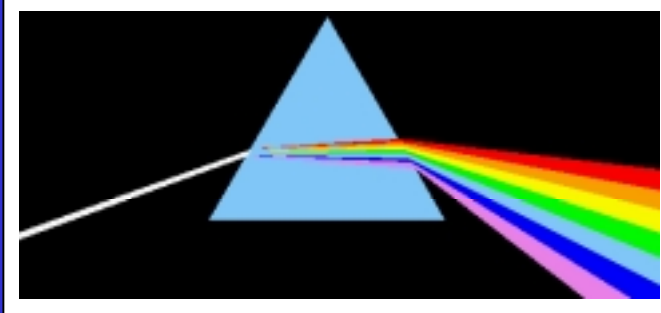
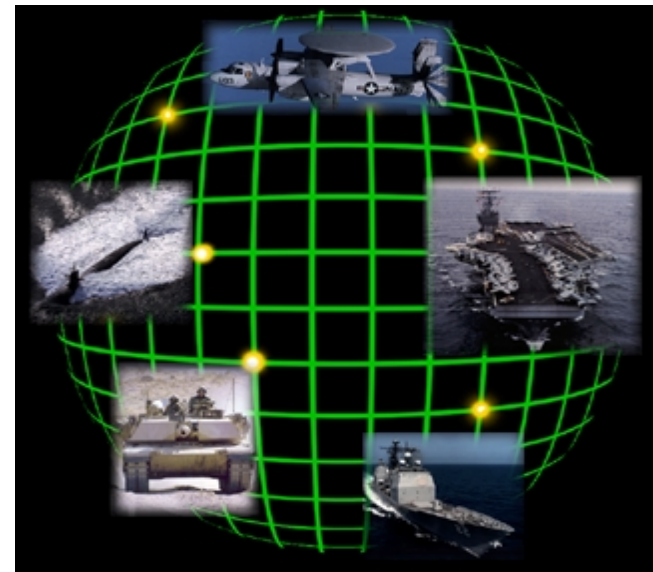


Wavelength Division Multiplexing (WDM) Technology for Naval Air Applications



Drew Glista
glistaas@navair.navy.mil

Naval Air Systems Command

Patuxent River, MD
301-342-2046

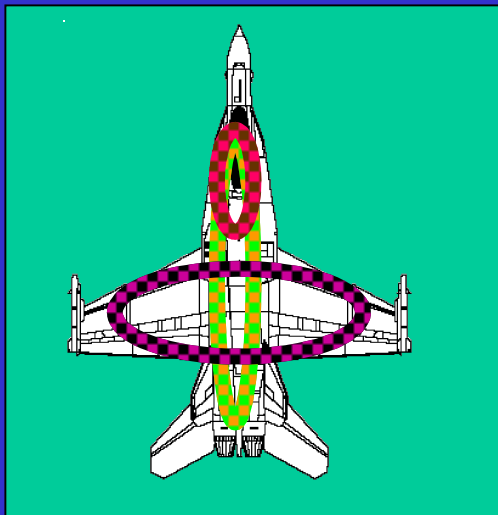
Approved for public release, distribution unlimited

| Report Documentation Page | | | Form Approved OMB No. 0704-0188 | | |
|--|------------------------------------|---|--|-------------------------------------|------------------------------------|
| Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. | | | | | |
| 1. REPORT DATE 28 JUN 2001 | 2. REPORT TYPE N/A | 3. DATES COVERED - | | | |
| 4. TITLE AND SUBTITLE Wavelength Division Multiplexing Technology for NAVAIR Applications | | 5a. CONTRACT NUMBER | | | |
| | | 5b. GRANT NUMBER | | | |
| | | 5c. PROGRAM ELEMENT NUMBER | | | |
| 6. AUTHOR(S) | | 5d. PROJECT NUMBER | | | |
| | | 5e. TASK NUMBER | | | |
| | | 5f. WORK UNIT NUMBER | | | |
| 7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Air Systems Command Patuxent River, MD | | 8. PERFORMING ORGANIZATION REPORT NUMBER | | | |
| 9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) | | 10. SPONSOR/MONITOR'S ACRONYM(S) | | | |
| | | 11. SPONSOR/MONITOR'S REPORT NUMBER(S) | | | |
| 12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release, distribution unlimited | | | | | |
| 13. SUPPLEMENTARY NOTES DARPA/MTO Workshop held June 28-29, 2001, at the Los Angeles International Airport Marriott, The original document contains color images. | | | | | |
| 14. ABSTRACT | | | | | |
| 15. SUBJECT TERMS | | | | | |
| 16. SECURITY CLASSIFICATION OF: | | | 17. LIMITATION OF ABSTRACT UU | 18. NUMBER OF PAGES 10 | 19a. NAME OF RESPONSIBLE PERSON |
| a. REPORT unclassified | b. ABSTRACT unclassified | c. THIS PAGE unclassified | | | |

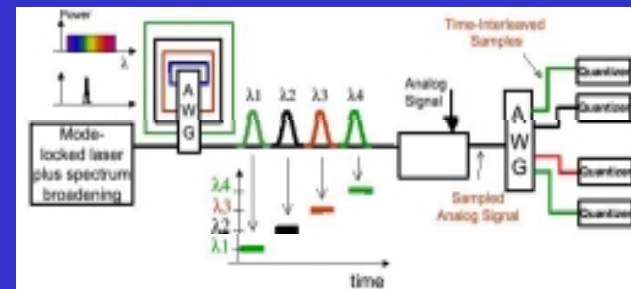
Naval Aerospace Photonics

- Despite Significant Commercial and DARPA Funding of WDM Technology, the Technology Has Yet to Impact Naval Aerospace Platforms.
- Affordability, Environmental Compatibility, and Technology Readiness Level Remain Impediments.
- Directed Technology Maturation at the Component, Packaging, and System Level Are Required.
- Broad Application to Fighter, Transport, ASW, AEW, VSTOL, UAV/UCAV, Rotary Wing, and Space Platforms.
- Many Common Issues with FTTH and FTTD

Potential WDM Applications

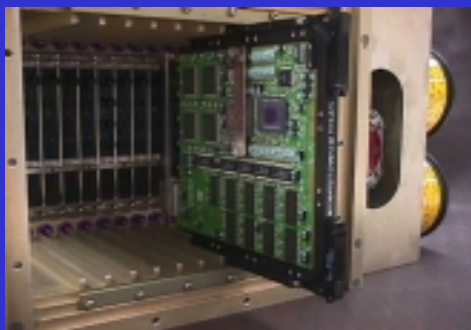


Free Space Interconnects



True Time Delay/
A/D Conversion

Unified Networks for Aircraft/
UCAV Avionics & VMS



WDM Computer

Smart Skins/Structures
Interconnect and
Diagnostics

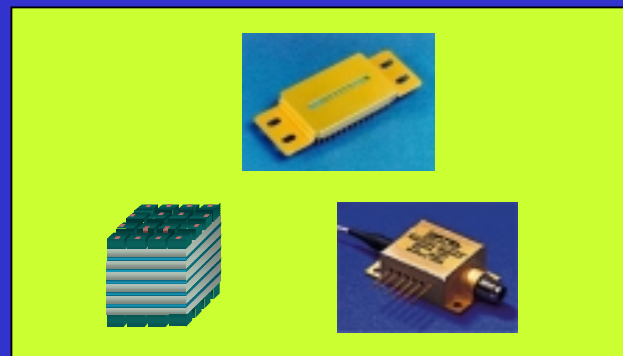


Missile and Decoy
Interfaces

Current NAVAIR WDM Developments



- FOCUS Program - Gen. 1 WDM Digital/RF Network for EA-6B and Advanced Electronic Attack (AEA) Platform (30 months)
- SBIR Phase II WDM RF Network (24 months)
- P-3 “Hairy Buffalo” Demonstration Sensor Integration Platform using WDM Networks (on-going)
- Broadband WDM Component Developments



Required Component Maturation

- **High Density Single Mode Cable Plant**
 - **Optimized Aerospace Qualified Fibers**
 - **Small Footprint Single Channel and Array Connectors**
 - **Rugged Single Channel and Ribbon Cables**
- * **ONR Has Initiated a Manufacturing Technology Program for Automated Termination of Single Mode Cables**
- **λ - Tunable Connectorized Transceivers with Digital and RF capability up to 40GHz**
- **Parallel Digital Channels over single fiber via WDM for high performance computing/backplanes**

Required Component Maturation

- Small Form Factor Tunable Filters
- Connectorized Planar Wavelength Selective Couplers and Array Waveguides, Add/Drops
- Compact Linear Multi-Band/Broadband Amplifiers
- Compact Wavelength Selective “All Optical” Switching - (nsec to μ sec Switching Speed)
- Embedded Structural Diagnostics
 - Bragg Grating and Fabry Perot Micro-sensors
 - Integrated WDM VMS Sensor Interface

Packaging/Connector Issues

- Aerospace Environment (Temperature, Shock, Vibration...etc) Requires Highly Integrated Devices and Components with Sealed, Connectorized, Low Profile Packages.
- Non-TE cooling preferred
- Highly Integrated WDM Transceivers Should include Built-in-Test Features
 - Power Monitors
 - Simple Logic BIT
 - Environmental Protection for Circuitry

DOD AVIATION High Speed Network Road Map

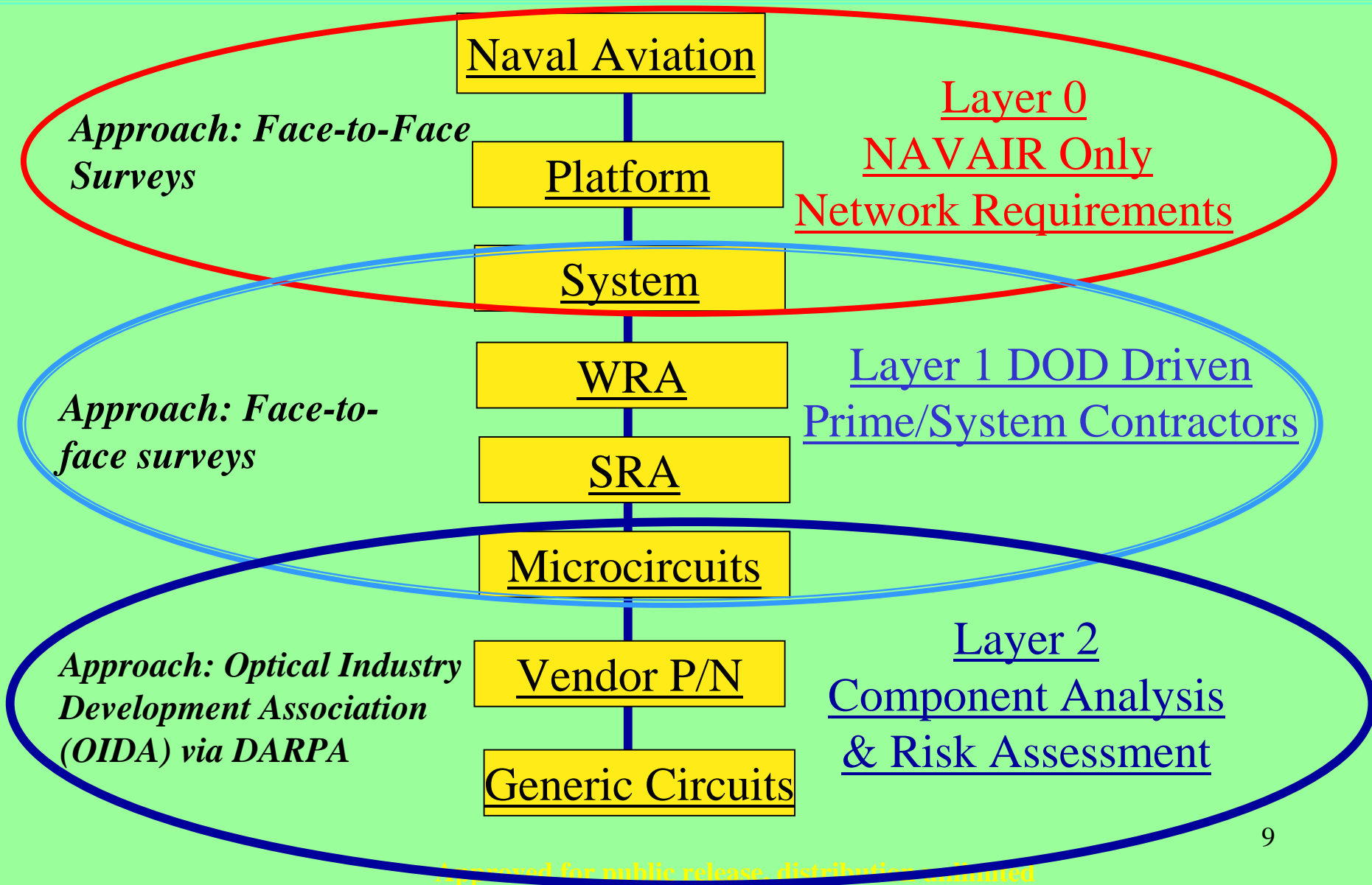
STAKE HOLDERS:

OSD (DDR&E)

US ARMY, US NAVY, USAF

DARPA

Layered Approach



Summary

- **COTS Components Must be Integrated, Packaged or Screened to Operate in this Harsh Environment**
- **Aerospace Systems Requirements are Unique and Expanding:**
 - Latency, Determinism, Throughput, RF Frequency Bands, Fault Tolerance, System and Structural Health Monitoring.
 - Aerospace Environment is the Challenge
- **Leverage Internet Driven Commercial WDM Technology**
- **Common DOD/Industry High Speed Network Roadmap in Progress for Long Term Investment Strategy**